

REMARKS

Entry of the amendments to the specification, claims and abstract before examination of the application is respectfully requested.


If there are any questions regarding this Preliminary Amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket # 095309.57675US).

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~~Safety device for a vehicle~~

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SAFETY DEVICE FOR A VEHICLE

BACKGROUND AND SUMMARY OF THE INVENTION

10 This application is a National Phase of
PCT/EP2004/012001, filed October 23, 2004, and claims
the priority of German patent document DE 103 51 752.9,
filed November 6, 2003, the disclosure of which is
expressly incorporated by reference herein.

15 The invention relates to a safety device method and
apparatus for a vehicle, in particular for a motor
vehicle, for reducing the risk of injury to a vehicle
occupant in the event of lateral impact accidents,
20 ~~having at.~~ At least one cushion element [[which]] is
arranged on the vehicle laterally adjacent to an
occupant position and can be moved by an actuating
device from a rest position into a deployed position in
the direction of the occupant position. The invention
also relates to a method for operating a safety device.

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A safety device of [[said]] such type is ~~known from~~
disclosed in German patent document DE 28 56 437 C2.
The actuating device comprises a lever, which is
~~embodied in such a way that~~ in the event of a lateral
30 crash, moves the cushion element ~~is moved by means of~~
~~the lever~~ in the direction of an occupant position more
quickly than the structure of the passenger [[cell]]
compartment, on which the cushion element is arranged,
moves in the same direction of the occupant position on
35 account of the accidental impact. An improvement in
Although this arrangement improves occupant protection
in lateral impact accidents, it does not achieve can be

~~obtained with the arrangement proposed in DE 28 56 437~~
~~C2. It is however a problem that an occupant is not~~
~~protected to an optimum degree in the event of a~~
~~lateral impact even with this arrangement since of~~
5 protection because, despite the relatively fast
~~deploying movement~~ deployment of the cushion element,
the distance between the cushion element and the
occupant is ~~[[too]]~~ so large, ~~and therefore that~~ a
relative movement between the cushion element and the
10 occupant cannot be eliminated completely.

~~Proceeding from this, the invention is based on the~~
~~object of producing~~ One object of the present
invention, therefore, is to provide a safety device for
15 a vehicle, ~~with~~ which minimizes the risk of injury to a
vehicle occupant in the event of lateral impact
accidents ~~can be reduced to a minimum.~~

This and other objects and advantages are achieved by
20 the safety method and apparatus ~~According~~ according to
the invention, ~~this object is achieved in that~~ in which
the actuating device can be driven by a vehicle-mounted
drive~~[[. The]]~~, and the cushion element can be moved
with the aid of the actuating device from a rest
25 position into a deployed position in the direction of
the occupant position by means of the vehicle-mounted
drive, without external action~~[[,]]~~ (for example by
means of an accidental impact[[,]] being necessary.
~~Furthermore~~ That is, the cushion element can be
30 actively moved in the direction of an occupant position
in order to reduce the distance between ~~[[an]]~~ the
occupant and the impact-absorbing cushion element in
the event of an impending or imminent accident. On
account of the short distance between the occupant and
35 the cushion element, the occupant cannot reach any high
speeds relative to the cushion element. Furthermore,
the occupant can be cushioned by the cushion element,

which is adjacent or at least situated in the direct vicinity, from the start of the accident onward.

5 The activation of the actuating device by a vehicle-mounted drive does not ~~exclude the possibility of prevent~~ the actuating device from also being moved in the direction of an occupant position by the action of a crash, ~~as is already known from~~ in the same manner as the prior art.

10

The cushion element can be arranged in or on a door or in or on a body pillar of the vehicle, so that the pelvis and ~~thorax~~ chest of a vehicle occupant can be protected to an optimum degree.

15

A plurality of cushion elements and/or additional foam elements which are arranged in series are advantageously provided. ~~The cushion elements and/or the foam elements, and~~ can have [[a]] an energy
20 absorbing foam and/or honeycomb structure, ~~so that they can absorb energy.~~ The individual cushion elements and/or foam elements can also have a varied design. ~~This makes,~~ making possible a progressive absorption of impact energy possible.

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The cushion elements and/or foam elements can be arranged such that they can be displaced with respect to one another and/or can be at least indirectly guided by linear guides. ~~These measures contribute~~ This
30 arrangement helps to make the cushion element or elements [[being]] moveable along a defined movement path in the direction of an occupant position.

[[One]] In particularly advantageous embodiment of the
35 invention, provides ~~that~~ the cushion element can be locked in a deployed position. ~~This has the advantage,~~

so that the impact energy can be dissipated in the deployed state of the cushion element.

The vehicle-mounted drive is advantageously embodied as
5 an electric motor. This type of drive is comparatively cost-effective and can be powered by the electrical system of the vehicle at relatively low cost. The electric motor can drive the actuating device, which in turn moves the cushion element from a rest position
10 into a deployed position in the direction of the occupant position.

The actuating device can have a traction means which is embodied as a cable or belt and is advantageously
15 stored, at least in sections, in or on a store. The traction means can be wound in the store, ~~it being possible for the store to~~ which can be driven by the vehicle-mounted drive. This ~~measure~~ permits an actuating device for moving the cushion element to be
20 formed with a particularly compact and simple mechanism.

According to another embodiment, an auxiliary drive is provided for moving the cushion element in the
25 direction of the occupant position. Said auxiliary drive can be formed by a spring store and/or by pyrotechnic elements. Said elements can be used to bring about a further increase in movement speed relative to the actuation of the cushion element or
30 elements activated by means of the vehicle-mounted drive.

It is ~~[[very]]~~ particularly advantageous if the vehicle-mounted drive and/or the auxiliary drive ~~are/is~~
35 are coupled to sensors for detecting the vehicle state and/or the state of the vehicle's surroundings. This makes it possible to control the vehicle-mounted drive

for the actuating device in order to move the cushion element in the direction of the occupant position as early as before an impact against another party to an accident. Sensors for detecting the vehicle state can include wheel speed sensors or acceleration sensors, which are also used for controlling other safety systems such as ABS, ESP or airbags. The surroundings of the vehicle can, for example, be monitored by means of cameras or other sensors which detect the surroundings (for example radar or infra-red sensors), so that another party to an accident which is approaching the vehicle obstruction can be detected.

[[At]] Preferably, at least one return element is provided for moving the at least one cushion element from a deployed position into the rest position ~~is advantageously provided. The, so that the system is~~ therefore reversible, and can be re-used. This is, for example, not possible in airbag systems, since they must be replaced after they have been triggered. In contrast, the cushion elements of the safety device according to the invention can be returned to the rest position after having been preventatively deployed, if no accident has occurred.

The return element ~~[[is]] advantageously formed as~~ comprises a tension spring, ~~so that and~~ the actuating device can move the cushion element from a rest position into a deployed position counter to the action of the spring, ~~and the.~~ The cushion element can then be returned to its rest position by the action of the tension spring. ~~The cushion element can also,~~ alternatively or optionally it may be reset by means of the actuating device which is driven by the vehicle-mounted drive.

Further advantageous embodiments and details of the inventions will emerge from the following description, in which the invention is described and explained in more detail on the basis of the exemplary embodiment illustrated in the drawing, in which:

Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 ~~[[shows]]~~ is a perspective side view of a section of a passenger ~~[[cell]]~~ compartment having a safety device according to the invention; and

Fig. 2 shows a cross-section through a safety device according to the invention, along ~~corresponding~~ ~~to the~~ section line II-II in fig. 1.

DETAILED DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a section of a passenger ~~[[cell]]~~ compartment of a vehicle 2. ~~The passenger cell has,~~ which includes an A pillar 4 and a B pillar 6, with a door 8 ~~[[being]]~~ arranged between the pillars. A ~~safety device~~ Safety devices 10 and a ~~safety device~~ 12 are arranged on the door 8 in the region adjacent to the B pillar 6. In addition, a further safety device 14 is provided in the B pillar 6, adjacent to the safety devices 10 and 12.

The safety device 10 is illustrated in cross section and in detail in figure 2. The door 8 has a door outer

skin 16 which outwardly delimits the passenger [[cell]]
compartment of the vehicle 2. A foam element 18, which
is stabilized by means of a schematically illustrated
core 20, is provided adjacent to the door outer skin
5 16. The foam element serves to absorb impact energy in
the event of a lateral impact against the door outer
skin 16.

An intermediate wall 22, which serves to reinforce the
10 structure of the door 7, is provided adjacent to the
foam element 18[[. A]], and bearing plate 24 is
arranged adjacent to the intermediate wall 22[[,]].
Arranged on [[which]] the bearing plate 24 are arranged
a total of three foam elements, specifically including
15 an upper foam element 26, a central foam element 28 and
a lower foam element 30. The foam elements 26 to 30
are of oblong form and extend in the direction of the
interior space of the passenger [[cell]] compartment of
the vehicle 2. An upper cushion element 32 is
20 displaceably mounted between the upper foam element 26
and the central foam element 28. ~~In a corresponding~~
fashion, and correspondingly a lower cushion element 34
is displaceably mounted between the central foam
element 28 and the lower foam element 30. The cushion
25 elements 32 and 34 are connected to a stowage
compartment 36 whose interior space can be accessed by
pivoting open an armrest 38.

The cushion elements 32 and 34 can be moved relative to
30 the foam elements 26 to 30 by ~~means of~~ an actuating
device which is denoted as a whole by the reference
designation 40. The actuating device 40 comprises a
tension belt 42, which is partially wound on a store
44. The actuating device 40 also comprises a drive 46
35 which drives the store 44, so that the tension belt 42
can be wound on to or unwound from the store 44. After
exiting the store 44, the tension belt 42 is guided

over a deflecting roller 48 and is initially wrapped around the lower foam element 30. The tension belt 42 then subsequently runs around the lower cushion element 34 and, as it runs on, around the central foam element 28, around the upper cushion element 32 and finally around the upper foam element 26. The tension belt 42 is secured at a fastening point 50 on the bearing plate 24.

10 In order to permit a deploying movement, indicated by dashed arrows 52, of the cushion elements 32 and 34 and of the stowage compartment 36, the store 44 can be driven in the drive direction denoted by the arrow 54, by ~~means of~~ the drive 46. This causes the tension belt
15 to be moved in the direction denoted by 56 and to be wound onto the store 44. As the tension belt 42 is wound, the section of the tension band between the store 44 and the fastening point 50 is shortened, so that the cushion elements 32 and 34 together with the
20 stowage compartment 36 perform a deploying movement indicated by the arrows 52. It is possible to form the store 44 as an automatic roll-up device which makes it possible to lock the tension belt 42 in a certain position. If ~~[[this]]~~ such locking is carried out in a
25 deployed position of the cushion elements 32 and 34, ~~[[said]]~~ the cushion elements 32 and 34 can be locked in the deployed position.

The cushion elements 32 and 34 and the stowage
30 compartment 36 can be moved back from a deployed position into a rest position, illustrated in figure 2, by means of two tension springs 58 which are arranged on the bearing plate 24 and are connected to the cushion elements 32 and 34. Here, the stowage
35 compartment 36 is guided by means of a linear guide 60.

With the presented safety device, it is possible for the cushion elements 32 and 34 and the stowage compartment 36 to be moved from the rest position illustrated in figure 2 into a deployed position as
5 ~~early as~~ even before an impact of another party to an accident against the door skin 16, so that the distance between a vehicle occupant and the stowage compartment 36 can be reduced to a minimum as early as before the start of the accident. This makes optimum occupant
10 protection possible.

The foregoing disclosure has been set forth merely to illustrate the invention and is not intended to be limiting. Since modifications of the disclosed
15 embodiments incorporating the spirit and substance of the invention may occur to persons skilled in the art, the invention should be construed to include everything within the scope of the appended claims and equivalents thereof.

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